

In the Claims:

Please cancel Claims 6-7, 14-15, 24-25, and 35-36 without prejudice.

Please amend Claims 1, 11, 12, 20, 26, 31 and 37 as follows.

- A2*
Sub B1
1. (Amended) A triple-junction solar cell comprising:
 - a first cell layer comprising a germanium (Ge) substrate doped with an n-type dopant, wherein the n-type dopants in the germanium substrate includes phosphorus and arsenic;
 - a nucleation layer disposed over the first cell layer;
 - a second cell layer comprising gallium arsenide (GaAs) disposed over the nucleation layer; and
 - a third fourth cell layer comprising indium gallium phosphide (InGaP) disposed over the second cell layer.

- A3*
Sub B1
11. (Amended) A triple-junction solar cell comprising:
 - a dual-junction structure comprising a first junction and a second junction;
 - a third junction having a p-type substrate, wherein the third junction doped with arsenic and phosphorus; and
 - a nucleation layer disposed between the dual-junction structure and the third junction and comprising a material that shares a substantially similar lattice parameter with the p-type substrate of the third junction, wherein the nucleation layer serves to control the diffusion depth of the third junction.
 12. (Amended) The triple-junction solar cell as recited in Claim 11 wherein the p-type substrate of the third junction is germanium (Ge) and the nucleation layer comprises indium gallium phosphide (InGaP).

20. (Amended) A method for controlling the diffusion of a dopant into a substrate during a subsequent device process during the fabrication of a multi-layer semiconductor structure, the method comprising:

- (a) disposing a nucleation layer over the substrate; and
- (b) performing the subsequent device process to form an overlying device layer containing the dopant, wherein the dopants include phosphorus and arsenic, wherein the nucleation layer serves as a diffusion barrier to the dopant in the overlying device layer such that diffusion of the dopant into the substrate is limited by increasing the thickness of the nucleation layer.

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26. (Amended) The method as recited in Claim 20 wherein a two-step diffusion profile is achieved in an n-p junction formed in the substrate.

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31. (Amended) A method for fabricating a multi-layer semiconductor structure, the method comprising:

- (a) preparing a germanium (Ge) substrate layer for doping by a dopant, wherein the dopants include phosphorus and arsenic;
- (b) disposing a nucleation layer over the germanium substrate layer;
- (c) disposing a middle layer comprising gallium arsenide (GaAs) over the nucleation layer; and
- (d) disposing a top layer comprising indium gallium phosphide (InGaP) over the middle layer, wherein the nucleation layer serves as a diffusion barrier such that diffusion of the dopant into the germanium substrate can be limited by increasing the thickness of the nucleation layer.

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(Amended) The method as recited in Claim 31 wherein a junction depth in the germanium substrate layer is substantially between 0.3 μm and 0.7 μm upon completion of said steps (a) through (g).